

A study of HDL and paraoxonase levels in women with Polycystic ovarian syndrome

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ABSTRACT:

Patients with polycystic ovary syndrome (PCOS) have an increased risk for the development of stress and cardiovascular disease. Paraoxonase is an enzyme that prevents oxidative modification of low – density lipoprotein. The enzyme is associated with HDL and is responsible for the antioxidant activity of HDL. The aim of this study was to measure the HDL level of PCOS patients and correlate with the paraoxonase enzyme level. These two being the risk factors for cardio vascular disease the analysis of HDL and paraoxonase level help us to assess the susceptibility of PCOS women for cardiovascular diseases.

Key words: Polycystic Ovary syndrome, HDL, Paraoxonase, cardiovascular diseases.

INTRODUCTION

PCOS is the most common reproductive endocrine disorder that is characterized by hyperandrogenism and chronic anovulation which affects 10% of reproductive aged women. PCOS women may have an increased risk for the development of atherosclerotic heart disease (AHD). Although, the exact mechanism of the risk is not known, an unfavourable body mass, lipid profile and dietary fats play a major role in the development of cardio vascular risk in them [1-4].

In recent prospective cardiovascular münster (PROCAM) simple scoring scheme 8 risk variables were identified; age, family history, Diabetes mellitus, smoking, LDL – C, HDL – C and triglycerides. A number of studies have reported that there is a characteristic dyslipidaemia in women with PCOS [5,6].

PCOS women reported to have a lower HDL – C values. Paraoxonase enzyme (PON1) which is synthesized in liver is a high – density lipoprotein associated enzyme that prevents oxidative modification of low density lipoprotein. Serum PON1 is located on HDL – cholesterol and is responsible for the antioxidant activity of HDL [7,8].

Genetic study of PON1 have speculated that the decreased level of PON1 and higher oxidative stress are related. The measure of serum levels of HDL and PON1 activity in PCOS patients, may help us evaluate the risk factors for cardiovascular disease in PCOS women [9].

The aim of the present study was to measure the serum levels of HDL and paraoxonase enzyme in PCOS women and to compare it with the controls of similar age group.

MATERIALS AND METHODS

The study group consisted 46 women in the age group of 23 – 37 attending the Outpatient Unit of Sri Ramachandra Medical College and Research Institute, Porur, Chennai. Blood samples were collected from the patients after getting proper consent from them. The sonographic diagnosis confirmed the PCOS status in them. The patients reported hirsutism, obesity problem, baldness, infertility problem, and some exhibited signs of menstrual abnormalities ranging from amenorrhea, oligomenorrhea, scant flow, dysfunctional uterine bleeding with heavy, frequent and painful periods. Normal cycling women of similar age group were chosen randomly as control group. 5 ml of blood was collected from both the groups, serum was separated and used for the analysis. The family history, morbidity details due to cardiovascular problems were collected from them.

LABORATORY METHODS

Venous blood samples were collected in test tubes and were centrifuged at 1500g for 5 minutes at 4°C. The aliquot was used for the studies of lipoproteins and the enzyme.

Estimation of HDL

Lipoproteins were fractionated by a dual precipitation technique. Total HDL was separated and the results are expressed as mg/dl [10].

Estimation of Paraoxonase

PON1 activity was assessed by the rate of enzymatic hydrolysis of O,O diethyl – O – p nitrophenyl phosphate (Sigma chemical) to p – nitrophenol in 1 mmol/l of CaCl₂ and 2 mmol/l of NaCl in 0.1 mol/l Tris – HCl (pH 8.0). The amount of p–nitrophenol generated was monitored by spectrophotometer [11].

Statistical analysis

Data was expressed as mean \pm SD. Student's "t" test was used for statistical analysis.

RESULTS

Table. 1. Levels of HDL and paraoxonase

Parameters	Control	Test
HDL	57.4543 \pm 5.01437	38.5637 \pm 7.02422
Paraoxonase	207.9152 \pm 7.4727	174.5065 \pm 19.5609

P<0.05

N=46

From the table.1 it is observed that a significant decrease in the HDL level was observed in the PCOS women when compared to the controls. A significant decrease in the mean serum PON1 activity is identified in PCOS group when compared to the controls.

It was noted that a positive correlation existed between the PCOS status and decrease in the level of PON1 enzyme.

DISCUSSION

Women with PCOS have an increased risk of developing dyslipidaemia and early – onset of cardiovascular disease. A number of studies suggested that patients with PCOS may be at an increased risk for cardiovascular disease [12,13].

In the current study we have observed a comparable relationship between HDL level and PON1 activity which are the risk factors for cardiovascular diseases in PCOS women. This study confirms the reduction in the level of HDL in women with PCOS [14].

In recent studies, decreased serum PON1 activity has been reported to be associated with increased risk for AHD. Since there is a decrease in the level of HDL, it allows the LDL units to get accumulated in the arteries. The accumulated lipid units produce undesired products that may induce a state of lipotoxicity [15, 16].

Moreover, the decreased level of paraoxonase impairs the lipid metabolism and allows the lipid to get accumulated, thereby enhancing the risk for cardiovascular complications at later stage in PCOS women. Serum PON1 is located on HDL – cholesterol and is responsible for the antioxidant activity of HDL [17].

From this study it is concluded that the decreased enzyme and HDL levels increase the oxidative stress and leads to the risk for cardiovascular complications in PCOS. Therefore, we hypothesize that the reduced HDL and reduced PON1 activity may contribute to the

increased susceptibility for cardio vascular risk in PCOS women. The correlation was made based on the morbidity due to cardiovascular disease in the patient's family who had previous history of PCOS in them.

CONCLUSION

Dyslipidaemia is a major factor contributing for the cardiovascular risk. HDL, being the scavenger lipoprotein, has the ability to remove the excess cholesterol that gets accumulated. This study shows that a reduced scavenging action exists in PCOS group thereby enhancing the risk for cardiovascular risk in such group. The paraoxonase enzyme which is associated with HDL is also reduced thereby increasing the susceptibility for cardiovascular risk in PCOS patients.

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